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FOOD PRODUCTION IN CHINA AND EFFECT
ON NATIONAL ECONOMY AND NUTRITION

[Comment and Summary: This report presents selected extracts from a Chinese-language monograph, written by Wu Hua-pao and published in 1950, entitled Chung-kuo-ti Liang-shih Sheng-ch'an (Food Production in China). Lack of detailed information for 1949 and 1950 made it necessary to use 1947 figures as a basis for comparison. The report includes 16 tables.

Wu's analysis of the crop situation shows that China's food supply has to be greatly increased to meet the basic requirements of an adequate diet. He points out certain mistakes made in distribution and management of land, and indicates what readjustments in agricultural production are necessary. Included in his program of recovery and development are the achieving of correct nutrition through planting the correct proportion of foods and increasing animal, fruit and vegetable production for more protein and minerals in the individual diet. Based on KMT government estimates, standards of basic per capita daily nutritional requirements are set up for children (ages 1-10), adults (ages 11-50), and the aged (over 50).

Production of materials for industrial use and for export are to be encouraged. Up to 1950, 80 percent of the farmers had been devoting 85 percent of their effort to producing food for local consumption. A 5-year goal is set up to be met by reapportioning land to different kinds of crops, bringing more land under cultivation where necessary, and increasing the production per unit of acreage already under cultivation.]

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I. FOOD CROPS

The food crop production for 1949 was estimated as 225 billion catties, and for 1950, as 240 billion catties. For these years, we have neither a breakdown of the different crops nor detailed information regarding the acreage. Therefore, we have to use the 1947 figures as a basis for computations. The year 1947 was a fairly good one for crops. The total food crop production for that year was set at the equivalent of 255.1 billion catties of unprocessed cereal crops. Potatoes were converted to cereals at the rate of 4 catties to one catty or unprocessed cereal crops. /The term "potatoes" throughout this report includes yams, sweet potatoes, and Irish potatoes./

It is estimated that production fell to 240 billion catties in 1950, but it is believed that the 1947 level can be reached again easily. For the sake of convenience, current production is assumed to be at the 1947 level in order that we can work out a program of recovery, reform, and development.

Table 1 reveals that the total of 490 million mou /one mou equals 1/6 acre/ planted to rice and wheat accounted for 45 percent of the total cultivated acreage in 1947 while the total production of these cereals was 1.4 billion catties, or about 62 percent of total grain production.

It should be pointed out that in Table 1, the production and acreage figures for soybeans and peanuts are net figures after deducting the amount used in oil production. It is estimated 50 percent of the soybeans and 35 percent of the peanuts are used for the production of oils. The soybean and peanut figures in Table 1 include only those used for food.

(The 1947 tables in this report are based on reports of the KMT Ministry of Agriculture and Forestry and the Ministry of Food.)

Table 1. Food Crops, 1947

Crop	Cultivated Area (million of mou)	Production (100 million catties)
Rice	280.4	966.9
Wheat	311.4	430.6
Barley	35.7	126.9
Sorghum	120.9	203.1
Millet	142.7	198.6
Corn	126.0	215.4
Rye	26.8	30.5
Oats	14.2	14.5
Pea	53.3	65.1
Broad beans	44.0	61.9
Peanuts	13.1	29.4
Soybeans	53.1	79.6

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Crop	Cultivated Area (million of mou)	Production (100 million catties)
Potatoes	51.3	515.4
Total, excluding potatoes	1,271.6	2,422.5
Total, including potatoes	1,322.9	2,937.9
Adjusted Total (4 catties of potatoes equal one catty of unprocessed grain)		2,551.4

In Table 2 the percentages for nonfood uses are the writer's estimates, not actual figures. In this table, which is prepared for use in later discussion, barley and eight other crops are combined under one heading called miscellaneous grains. Rice and wheat are listed separately because of their relative importance in the group. Soybeans and potatoes are not included in miscellaneous grains because their nutritional value differs greatly from that of rice, wheat, and the other grains.

The difference between total production and the amount used for other purposes is the total consumption as food, consisting of rice, wheat, and miscellaneous grains totaling 200.3 billion catties, soybeans 5 billion catties, and potatoes 38.1 billion catties, or a total of 243.4 billion catties.

/See table on following page./

Table 2. Food Crops Not Used for Food, 1947

Crop	Cultivated Area (million mou)	Production (100 million catties)	Seeds (%)	Feed (%)	Industrial Use (%)	Storage, Transport Losses (%)	Total Other Than for Food (%)	Unprocessed Food Crops (100 million catties)
Rice	280.4	966.9	4	--	1	6	11	860.5
Wheat	311.4	430.5	8	1	--	6	15	366.0
Miscellaneous								
Grains	626.7	945.4	7	8	1	6	22	737.4
Soybeans	53.1	79.6	14	10	--	12	36	50.9
Potatoes	51.3	515.4	7	7	--	12	26	381.4
Total	1,322.9	2,937.9						2,396.2

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Two points need explanation:

1. The amount of soybeans for industrial use, which is approximately 50 percent, has already been deducted from the production figure in the table. The deducted amount is used entirely in the making of oil. Therefore, when we estimate the amount used for seeds, feed, storage, and transportation losses, etc., the percentages are double those of the other grains.

2. The actual percentages for losses in storage and transportation are very high. Although it is true that part of the crops can be stored in country warehouses to minimize losses in transportation, such facilities are quite poor, and permit much higher losses because of worms, sparrows, and mice. Whether or not the estimated average loss of 6 percent is too high still remains to be discussed. The estimated percentage of loss for potatoes, a bulky item containing much water, must be doubled.

In addition to the above agricultural products, there are other foods needed for daily consumption, including vegetables, fruits, vegetable oils, and animal products such as meat, fat, fish, and eggs. The consumption of these foods may affect the amount of grains consumed. In this connection several tables have been prepared.

Table 3. Total Vegetable and Fruit Production, 1947
(Report of KMT National Economic Council)

	Production (100 million catties)
Vegetables	346
Fruit	67
Total	413

No question is raised here concerning the accuracy of the above figures. The fact is that present fruit production has fallen off considerably, while vegetable production has remained at about the previous level.

The joint study made by the KMT Ministry of Agriculture and Forestry and the Ministry of Foods reveals that in 1947 the total production of four crops used in the refining of vegetable oils was 18.2 billion catties. The entire crops of soybeans and peanuts were available for the making of vegetable oils. Two percent of the total production of oil-producing vegetables had to be retained for seeds. Only 40 percent of the sesame seed crop could be used for oil production; therefore, the total amount available for use in oil refineries was 17.3 billion catties, producing about 4 billion catties of vegetable oil. The percentages of oil recovery for these different products varied as shown in the following table.

Table 4. Vegetable Oil Production, 1947

Products	Cultivated Area (million mou)	Production (100 million catties)	Amount Used for Oil (100 million catties)	Oil Recovery (%)	Oil Produced (100 million catties)
Soybeans	53.1	79.6	79.6	11	8.8
Rape seed	87.7	74.5	73.0	32	23.4
Peanuts	7.0	15.8	15.8	38	6.0
Sesame seed	18.9	13.0	5.2	43	2.2
Total	166.7	182.9	173.6		40.4

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In 1947, according to the former National Economic Council, meat production was more than 3.3 billion catties. This included beef, pork, mutton, and poultry (chickens, ducks, geese). More than 500 million catties of fat was produced, making a total of 3.9 billion catties of meat and fat. The distribution was as follows: pork and fat, 73 percent; mutton and fat, more than 10 percent; beef and fat, more than 9 percent; poultry more than 7 percent. In 1947, the total fish catch was about 1.4 billion catties. The total egg production from chickens, ducks, and geese was 8.8 billion. Assuming ten eggs have an average weight of one catty, that would make more than 800,000 catties. The total production of meat, poultry, fish, and eggs was about 6.2 billion catties. The numbers of livestock and poultry have decreased considerably since 1947, resulting in corresponding decrease in the amount of meat available for consumption.

/See table on following page./

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Table 5. Livestock, Poultry, Meat, and Fat 1947

	No of Head (millions)	Slaughtered (%)	Slaughtered (10,000 head)	Per Head Meat Produced (catties)	Per Head Fat Produced (catties)	Meat (100 million catties)	Fat (100 million catties)
Water buffaloes	10.1	5	50	100	10	.5	0.05
Cattle	23.3	12	280	100	10	2.8	.28
Pigs	59.4	80	4,752	50	10	23.8	4.76
Goats	21.0	40	840	20	3	1.7	.25
Sheep	20.8	30	624	30	3	1.9	.19
Chickens, ducks, geese	277.1	100	27,710	1	--	2.8	--
Total						33.5	5.53

NOTE: The figures for chickens, ducks, and geese have been adjusted to exclude losses from disease and to include the young. The slaughter of poultry is assumed to produce an average of one catty of meat per head.

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Table 6. Animal Products, 1947

	Production (100 million catties)
Meat	33.5
Fat	5.5
Fish	14.4
Eggs	8.8
Total	62.2

Table 7. Cultivated Areas for Indicated Crops, 1947

Crop	Cultivated Area (million mou)	Cultivated Area as % of Total Area
Rice, wheat, and miscellaneous grains	1,322.9	82.83
Oil seeds	166.7	10.44
Vegetables	30.0	1.88
Cotton	38.0	2.38
Hemp	4.0	0.25
Tobacco	9.7	0.60
Mulberry trees	4.0	0.25
Tea	1.8	0.11
Sugar cane, beets, peppermint, indigo and other native products	20.0	1.26
Total	1,597.1	100.00

II. CONSEQUENCES OF PRESENT FOOD CROP SITUATION

The preceding analysis of the present grain and food production in China reveals unfavorable affects in connection with the development of the national economy and with regard to personal nutrition.

From the statistics already presented, it is calculated that more than 80 percent of the farmers spend 85 percent of their effort to produce enough for their own food requirements. Under such conditions not only is the accumulation of national capital difficult, but also raw materials for industrial uses are very limited. The development and progress of industries are often obstructed by these difficulties. For instance, there are now 5,200,000 spindles which use 11,440,000 piculs of cotton annually (2.2 catties for each spindle). In addition, hand textile industries need 2,400,000 piculs and blankets 4,800,000 piculs, making a minimum annual requirement of 18,600,000

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piculs. Assuming present cotton production is 14 million piculs, then the maximum that can be allotted to textile factories is 8 million piculs. This will keep only 80 percent of the spindles in operation, hindering the development of the textile and dye industries.

Another example is found in tobacco. The annual requirements of raw materials for machine and hand factories are 12 million piculs. However, the total actual production does not even reach one sixth of the requirements yet. Imports of jute bags and sugar have been large, but the production of tea and silkworms has been decreasing over the past few years.

The above facts indicate that the cultivated area in grain is not in the right proportion to that used for industrial raw materials. The former has been too high, the latter too low, causing a disproportionate development in our national economy. The expansion of light industries is affected most by these obstacles with further consequences in insufficient accumulation of industrial capital and limited outlets for investment capital for productive purposes.

According to 1947 figures, total food production was 257.2 billion catties of which rice, wheat, miscellaneous grains and potatoes accounted for 80 percent, vegetables 16 percent and animal products only 2.4 percent. This includes 55.9 catties of polished rice, after having deducted 35 percent for bran and husks from the amount of raw rice as shown in the last column of Table 2, making no adjustment for wheat, and deducting 10 percent from miscellaneous grains. Based upon these figures (assuming no other losses and no exports) and upon the analysis made by the authorities, we arrive at the following preliminary conclusions concerning the problem of nutrition:

Source of Calories

It would seem that in a normal crop year, the average daily per capita consumption is more than 3,000 calories which is in excess of the standard requirements. However, from the above-mentioned percentages of the quantities of different foods produced, we cannot infer that these foods furnish calories in the same proportion. This is due to the fact that foods vary in caloric value. According to a special study, farmers get more than 90 percent of their required calories from grains, beans, and potatoes; vegetables and fruit account for 5 percent, and animal products for 2 percent. To meet the minimum daily calorie requirements it is apparent that one has to eat a large quantity. This will put too much of a burden on the digestive organs, causing stomach and intestinal troubles in time. It has been authoritatively stated that to avoid excessive quantities one ought to eat food having from 10 to 25 percent fat. Most Chinese people are far from reaching this standard.

Table 8. Food Production, 1947

	Production (100 million catties)	Production (%)	Remarks
Rice, wheat, miscellaneous grains	1,624.8	63.2	Rice 55.91 billion, wheat 36.6 billion, miscellaneous grains, 69.97 billion catties. /In Table 2, rice is given as 86.05 billion and miscellaneous grain as 73.74 billion catties./
Soybeans	50.9	2.0	
Sweet potatoes	381.4	14.8	
Vegetables and fruit	413.0	16.1	

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	Production (100 million catties)	Production (%)	Remarks
Vegetable oil	40.4	1.5	
Animal products	62.2	2.4	
Total	2,572.7	100.0	

As far as the nutritional value of grain is concerned, wheat is rated first, containing more protein, calcium, and phosphorus than any other grain. Although wheat can be planted anywhere in the country, unfortunately the amount produced is very little, accounting for only 23 percent of total grain production. Miscellaneous grains, such as millet, sorghum, corn, and barley, are used as main foods by many farmers in several areas. But their nutritional value is quite low. Soybeans contain much high quality protein, calcium, and phosphorus and the caloric value is also high because of oil content. Although soybeans is a very common food, production is only 2 percent of total crops.

Protein

According to the physical makeup of the Chinese, each person requires 80 grams of protein, and 100 grams are quite sufficient for an average person. But the protein content of food cannot be improved much due to the fact that the percentage of protein /consumed/ in meat, poultry, and leafy vegetables is too low. However, it is fortunate that the quality of protein in soybeans is relatively high so that there is compensation for the insufficiency of protein in grain. In general, adults get enough protein, both quantitatively and qualitatively, from their daily foods. However, children do not have enough during the period of their growth, because they do not eat enough eggs and vegetables.

Minerals

Only one half of the minimum daily requirement of calcium, which is 0.8 gram is consumed, while the daily intake of phosphorus and iron is twice the minimum requirement. This very uneven distribution of minerals is caused by the fact that the proportion of grain used in foods has been too high. Leafy vegetables and fruit are rich in calcium, but their production has been quite low, and most farmers are not used to eating them. The consequent lack of calcium is especially serious from the standpoint of the growth of children. In spite of there being enough phosphorus, the deficiency of calcium has made for poor metabolism. This has resulted in an insufficiency of both calcium and phosphorus, causing a most unfavorable effect on the human bone structure.

Vitamins

Rice supplies only half as much vitamin A and vitamin B as wheat. Rice loses its vitamins because of overrefining. Vitamins C and D are also insufficient since not enough meat, eggs, and vegetables are consumed. Children are particularly affected by these deficiencies, since vitamins are so important for their growth.

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III. TOTAL DEMAND FOR FOOD

Three steps are necessary to determine the total demand for grain and other food: (1) determine the daily requirements for each person, (2) determine the total population, and (3) calculate daily and annual requirements for the whole nation.

Daily Requirements for Each Person

With the help of specialists in the nutritional field and by giving consideration to present production and its possible increase in the near future, the following standards have been set up as the daily requirements for an adult:

Rice, wheat, and miscellaneous grains	1 catty and 2 liang*
Soybeans	1 liang
Potatoes	8 liang
Vegetables and fruit	1 catty
Vegetable oil	$\frac{1}{2}$ liang
Animal products (meat, fat, fish, and eggs)	2 liang

/* One liang equals 1/16 catty/

Requirements for the aged and the young are quite different from the above standards. In a later part of this study we shall adjust the population figures by putting them all on the basis of adults to determine the total food requirements. Requirements differ for country people and city people, for men and women, and for heavy industry workers and light industry workers. It is very difficult to calculate their requirements separately except on an average basis.

The aforementioned standards provide for daily nutrition as shown in the following table. If the standards of this table are to be reached within a few years, and further improvements are to be planned, it is necessary to increase the consumption of animal products and soybeans and to decrease, correspondingly, the consumption of grains.

Table 9. Daily Average Food Requirements and Nutritional Value

	Rice, Wheat, Miscellaneous Grains (1.2 catties)	Soybeans and Products (1 liang)	Potatoes (0.5 catty)	Vegetable Oil (0.5 liang)	Vegetables and Fruits (1 catty)	Meat, Fat Fish, Eggs (2 liang)	Total
Calories	2,142	65	245	135	185	155	2,927
Proteins (g)	60.6	6.5	3.4		8.2	6.8	85.5
Fats (g)	10.8	2.8	1.4	15	0.5	14.2	44.7
Carbohydrates (g)	469	3.5	54.7		35	.1	562.3
Calcium (g)	.156	.103	.075		.66	.017	1.011
Phosphorus (g)	.738	.072	.3		.32	.101	1.531
Iron (g)	24.3	1.19	1.7		7.7	1.08	35.97
Vitamin A (International units)		15	10,442		16,400	301	27,158
Vitamin B_1 (mg)	1.20	.14	.25		.28	.12	1.99
Vitamin B_2 (mg)	.36	.02	.18		.75	.102	1.41
Vitamin, Nicotinic Acid (mg)	11.4	.3	1.8		2.0	.9	16.4
Vitamin C (mg)			43		133		176

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Total Adult Population

Since dietary standards are set up according to the needs of adults, we must consider the total population on an adult basis, so that we can arrive at the figure of total food requirements for the whole country. It is estimated that food consumption by children is about one half that by adults. The aged, on the other hand, consume about two thirds as much. At this rate, the latest estimated total population figure of 477,300,000 (excluding Taiwan) can be adjusted to the equivalent of 396,150,000 adults, as shown in the following table.

Table 10. Data on Population (unit, 10,000)

Age Distribution	Percent	Actual Number	Coefficient	Adjusted No of Adults
Children: below 10 years	25.0	11,932.5	1/2	5,966
Adults: 10 to 50 years	61.5	29,354.0	1	29,354
Aged: over 50 years	13.5	6,443.5	2/3	4,295
Total	100.0	47,730		39,615

Annual Food Requirements

Considering the total adjusted adult population at 396,150,000, for the sake of convenience, we shall round out the figure to 400 million. The daily and yearly food requirements are shown in the following table:

Table 11. Food Requirements

Type of Food	Per Capita Daily Requirements		Total National Daily Requirements (million catties)	Total National Annual Food Requirements (100 million catties)	Total Annual Requirements for Unprocessed Food Crops (100 million catties)
Rice, wheat, miscellaneous grains	1-1/8	catty	480	1,752	2,526.3
Soybeans	1	liang	25	91	142.3
Potatoes	8	liang	200	730	986.5
Vegetables and fruit	1	catty	400	1,460	1,460.0
Vegetable oil	0.5	liang	12.5	45.6	206.4
Meat, fish, eggs	2	liang	50	182	182.0

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Converting the figure for total finished agricultural food required annually to that for unprocessed food crops and adding those agricultural products not used for food, as shown in Table 2, we arrive at the total requirements for agricultural raw materials. This is about 386.1 billion catties, including rice, wheat, miscellaneous grains, beans, potatoes, and oil seeds. If the figure for potatoes is adjusted at the rate of 4 catties of potatoes to one catty of unprocessed grain, the figure becomes 312.1 billion catties. If losses in storage and transportation can be minimized in the future, a total production of 300 billion catties of grain should be sufficient to cover total requirements.

IV. COMPARISON OF DEMAND AND PRODUCTION

Table 12 shows that if we intend to raise our nutritional standards, the total demand for all kinds of food will exceed the 1947 production figures. For example, the total demand for wheat and miscellaneous grains will exceed production by 12.7 billion catties. It is considered that this shortage of about 8 percent of the 1947 production can be overcome easily. However, production of soybeans has been decreasing in recent years. A sufficient supply was expected, but was not forthcoming. With daily consumption at the rate of one liang per person we are already experiencing a shortage of 4 billion catties, or 79 percent of the total production.

The actual total production figure is of course greater than that shown in the table. As previously stated, the amount appearing in the table has been reduced by 50 percent to adjust for the soybeans used in the manufacture of oil. Since soybeans have such high nutritional value we should do our utmost to increase their production. Furthermore, the amount for export should also be given careful consideration, as it has a direct effect on the amount available for food, for industrial uses, and for fertilizer, all of which have a great influence on the national economy.

The cultivated area for potatoes was 51 million mou in 1947 as against 32 million mou in 1934, showing an increase of 19 million mou. This indicates that our people have already acquired the habit of eating more potatoes. The reasons for this may be the increased production per unit of cultivated area due to the production needs during war time. We should endeavor to use more potatoes in the future so that the nutritional content of our food can be improved. As indicated, the total demand will exceed production by 34.8 billion catties, or 91 percent of the present production.

The most serious shortage is noted in vegetables and fruit. Demand is greater than production by 104.7 billion catties, or two and a half times the production figure. The estimated current production of vegetables and fruit is even lower than the 1947 level. As recommended by the Chinese Medical Association during the KMT regime, the minimum annual requirements for vegetables and fruit for each person should be 657 catties and 250 catties, respectively, or a total of 907 catties. To be realistic, if we assume that each person consumes only 365 catties of vegetables and fruit each year, the total consumption would exceed the total production by a considerable margin. Thus, we shall have to increase production.

Special attention should be given to vegetables, because it is felt that it will be easier to increase vegetable production than that of fruit. Furthermore, leafy vegetables have a higher nutritional value than fruit. But our farmers are not much interested either in planting vegetables or in consuming them. Their chief interest is in grain, both as to production and consumption. This attitude should be gradually corrected.

Table 12.   Comparison of Total Food Demand and 1947 Production
(in 100 million catties)

	1947 Production		Total Demand		Demand Over Production			
		Unprocessed		Unprocessed	Food Shortage		Unprocessed Crop Shortage	
	Food	Food Crops	Food	Food Crops	Amount	Percent	Amount	Percent
Rice, wheat, miscellaneous grains	1,624.8	2,342.9	1,752	2,526.3	127.2	8	183.4	8
Soybeans	50.9	79.6	91	142.3	40.1	79	62.7	79
Potatoes	381.4	515.4	730	986.5	348.6	91	471.1	91
Vegetables and fruit	413.0	413.0	1,460	1,460.0	1,047.0	254	1,047.0	254
Vegetable oil	40.4	182.9	45.6	206.4	5.2	13	23.5	13
Meat, fish, etc	62.2	62.2	182	182.0	119.8	192	119.8	192

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The total production of oils derived from soybeans, peanuts, oil-producing vegetables, and sesame seeds is 4 billion catties as against total requirements of 4.5 billion catties. The gap amounts to only 13 percent of the total production and should be easily closed. The production of animal products, such as meat, fat, fish, and eggs is far behind the total demand. The difference runs as high as 11.9 million catties, or 192 percent of the total production. The current supply of meat, fat, and eggs is even worse. A positive program must be put into effect to increase production to meet general needs.

V. PROSPECTS OF INCREASING PRODUCTION

Grain and Vegetables

Roughly speaking, within a period of 5 years, it is expected that the average production of rice, wheat, miscellaneous grains, and soybeans can be increased by 30 percent or to 250 catties per acre; potatoes 50 percent, or to 1,500 catties per acre; and vegetables 100 percent, or to 2,300 catties per acre. The above increases do not take several factors into consideration. Losses during storage and transportation can be reduced from 6 percent to one percent by improvements and efficiency in distribution channels.

The net output of finished products can be increased by improving manufacturing processes. With the promotion of nine to one rice /nine parts rice to one part bran/ and eight to two flour /eight parts flour to two parts bran/ now under way everywhere, there should be more food. On the basis of improved agricultural techniques alone it is expected that within 5 years, the total production of rice, wheat, and miscellaneous grains will reach more than 300 billion catties, with corresponding increases in soybeans, potatoes, and vegetables, as shown in Table 13.

Comparing total production after increases and total requirements it is noted that we shall have a surplus in rice, wheat, and miscellaneous grains of about 51.9 billion catties. However, soybeans, potatoes, and vegetables are still short by 3.8 billion, 21.3 billion, and 63.4 billion catties, respectively.

Table 13. Comparison of Increased Production and Demand

	1947 Production (100 million catties)	Estimated Increase in 5 Yr (%)	Estimated Increase in 5 Yr (100 million catties)	Total Estimated Production (100 million catties)	Total Demand (100 million catties)	Surplus or Deficit (100 million catties)
Rice, wheat, miscellaneous grains	2,342.9	30	702.9	3,045.8	2,526.3	+ 519.5
Soybeans	79.6	30	23.9	103.5	142.3	- 38.8
Potatoes	515.4	50	257.7	773.1	986.5	- 213.4
Vegetables, fruit	413.0	100	413.0	826.0	1,460.0	- 634.0

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Vegetable Oils

As indicated above, the total production of vegetable oil from soybeans, oil-producing vegetables, peanuts, and sesame seeds is 4 billion catties. The actual total requirements are 4.5 billion catties. Accordingly, there is a deficiency of 500 million catties. An increase of 30 percent in oil seed production would also result in a 30 percent increase in vegetable oils, that is, by 1.2 billion catties. Instead of a deficit we should then have a surplus of 700 million catties, which would probably be for the use of city people, who are the greatest consumers. Both the rate of increase and the amount of production of vegetable oils can be greatly raised if modern refineries and facilities are installed. Further sources of supply of vegetable oils are found in cottonseed. Thus far, we do not consume cottonseed oil because as now processed it is not fit for human consumption. However, if certain improvements are made in refining processes, such oil would be usable. With the increased production of cotton in the future, if a great quantity of cottonseed oil is made available, there should be no problem as far as vegetable oils are concerned.

Animal Products

Much difficulty will be found in the case of animal products, such as meat, fat, fish, and eggs. Shortages are so acute, that even the greatest estimated increased production cannot match consumption. According to the best estimates, pork, beef, mutton, and fats could be increased by 50 percent in 5 years, while the production of eggs could be increased by 100 percent. Present production of aquatic products is 1.4 billion catties, equal to only 50 percent of the prewar production of more than 3 billion catties. In view of the numerous good harbors along the coast of China which is more than 12,000 kilometers long, and of the many rivers and lakes located in the interior, reserves of aquatic products must be plentiful and the outlook for increased production is very favorable. With careful planning, production may be increased by 300 percent after 5 years, reaching an annual production of 5 or 6 billion catties.

Table 14. Production Increases of Animal Products
(in 100 million catties)

	1947 Production	Increase in 5 Yr (%)	Estimated 5 Yr Increase in Quantity	Estimated Total Production
Meat	33.5	50	16.8	50.3
Fat	5.5	50	2.7	8.2
Fish	14.4	300	43.2	57.6
Eggs	8.8	100	8.8	17.6
Total	62.2		71.5	133.7

With the increase in production indicated above of about 7.1 billion catties, estimated total production is 13,370,000,000 catties, still leaving a shortage of 4.8 billion as compared with total requirements of about 18.2 billion catties. If the shortage cannot be eliminated within five years, further steps should be taken to increase production. In any case, the number of livestock must be raised by all possible means.

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VI. EFFECT OF SURPLUSES AND DEFICITS ON LAND USE

To utilize the land most efficiently, the cultivated areas must be properly allocated to the various uses. To achieve this, we must begin by taking the surpluses or deficits as our basis of computation. With increased production the net surplus of rice, wheat, and miscellaneous grains is 51.9 billion catties. Assuming 10 billion catties will be set aside as a reserve for emergencies and another 10 billion catties for exports, the net balance is 31.9 billion catties. This leaves too large a surplus which should be reduced so that production is brought closer to actual need.

The cultivated areas for these surplus grains can, therefore, be converted to other uses. Soybeans, potatoes, and vegetables even after increased production will still be in very short supply. The cultivated areas for these products should be expanded to balance demand and supply. According to our calculations, the cultivated areas for rice, wheat, and miscellaneous grains should be reduced to 127 million mou. Cultivated areas for soybeans, potatoes, and vegetables should be increased by 20 million mou, 14 million mou, and 28 million mou, respectively, for a total of 62 million mou.

The above adjustments will result in a net gain of more than 64 million mou of cultivated land. To increase the production of industrial raw materials these surplus acres can be used for the planting of cotton, hemp, and other products which are badly needed for the industrialization program of the next 5 years.

Table 15. Food Surplus or Deficit After Increased Production

	Surplus or Deficit (100 million catties)	Production Per Unit After Increasing /and Decreasing/ Production (catties per mou)
Rice, wheat, miscellaneous grains	+ 319.5	250
Soybeans	- 38.8	195
Potatoes	- 213.4	1,500
Vegetables	- 634.0	2,300

Production Plans for Various Crops

If the above assumptions and ideas materialize within 5 years, the production program for agricultural products would be that shown in Table 16. The total requirements of rice, wheat, and miscellaneous grains is 272.6 billion catties of which 252.6 billion catties are used for food, 10 billion catties for emergency reserves, and 10 billion catties for exports. When production reaches 250 catties per mou, the total cultivated areas for these products would be reduced to 1,091,000,000 mou, or a reduction of 127,500,000 mou from the 1947 level. The percentage of cultivated land used for rice, wheat, and miscellaneous grains would drop from 76.29 percent to 68.32 percent, a decrease of 7.97 percent.

Since the production of potatoes and vegetables has been far below the amounts required, not only must we increase the production per mou, but the total cultivated area must also be expanded by about 62 million mou. The percentage of cultivated land used for potatoes and vegetables should be increased by 3.91 percent, from 8.42 percent to 12.33 percent.

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If we take the aforementioned cultivated areas for all grains, the total percentage drops from 84.7 percent to 80.65 percent, or a net change of just over 4.0 percent.

The production of oil seeds has been sufficient. After increasing production per unit of cultivated area, a surplus of more than one billion catties will have already accumulated which can be used for exports. Therefore, there will be no need to increase the total cultivated area devoted to oil seed producing crops.

Cotton, hemp, tobacco, tea, mulberry trees, sugar cane, beets, peppermint, and other special products are all very important raw materials. Their production must be greatly increased to fit into the program of the industrial expansion. An increase of 83 percent, or 64.5 million mou, is planned. Thus the percentage of cultivated area for these products will be raised by 4.04 percent, from 4.85 to 8.89 percent. The production of cotton will then exceed domestic requirements by 5,900,000 piculs, which surplus can be exported either as raw cotton or cotton goods.

/See table on following page._/

Table 16. Program of Production for Indicated Crops

Products	Culti-vated Area (million mou)	Culti-vated Area (%)	Total Production (100 million catties)	Production per Mou (catties)	Culti-vated Area (million mou)	Culti-vated Area (%)	Production per Mou (100 million catties)	Total Produc-tion per Mou (catties)	Total Domestic Demand (100 million catties)	Reserves, Exports, Other Uses (100 million catties)
Rice, wheat, miscel-laneous grains	1,218.3	76.29	2,342.9	191	1,091	68.32	2,727.5	250	2,526.3	201.2
Soybeans	53.1	3.32	79.6	150	73	4.57	142.3	195	142.3	
Potatoes	51.3	3.22	515.4	1,000	66	4.13	990.0	1,500	986.5	3.5
Oil seeds	166.7	10.44	182.9	110	167	10.46	217.1	130	206.4	10.7
Vegetables	30.0	1.88	346.0	1,150	58	3.63	1,334.0	2,300	1,326.0	8.0
Fruit			67.0				134.0		134.0	
Cotton	38.0	2.38	10.0	26	70	4.38	24.5	35	18.6	5.9
Hemp, to-bacco, tea, mulberry trees, sugar cane and other crops	39.5	2.47			72	4.51				
Total	1,597.1	100.00			1,597	100.00				

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